MPS2222, MPS2222A

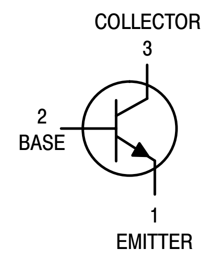
MPS2222A is a Preferred Device

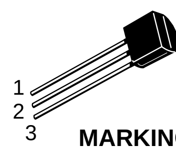
General Purpose Transistors

NPN Silicon

ON Semiconductor™

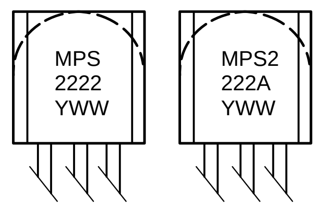
http://onsemi.com





TO–92
CASE 29
STYLE 1

MARKING DIAGRAMS



Y = Year
WW = Work Week

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage MPS2222 MPS2222A	V_{CEO}	 30 40	Vdc
Collector–Base Voltage MPS2222 MPS2222A	V_{CBO}	 60 75	Vdc
Emitter–Base Voltage MPS2222 MPS2222A	V_{EBO}	 5.0 6.0	Vdc
Collector Current – Continuous	I_C	600	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	 625 5.0	 mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	 1.5 12	 Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–55 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	°C/W

ORDERING INFORMATION

Device	Package	Shipping
MPS2222	TO–92	5000 Units/Box
MPS2222A	TO–92	5000 Units/Box
MPS2222ARLRA	TO–92	2000/Tape & Reel
MPS2222ARLRM	TO–92	2000/Ammo Pack
MPS2222ARLRP	TO–92	2000/Ammo Pack
MPS2222RLRA	TO–92	2000/Tape & Reel
MPS2222RLRM	TO–92	2000/Ammo Pack
MPS2222RLRP	TO–92	2000/Ammo Pack

Preferred devices are recommended choices for future use and best overall value.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I_C = 10 mAdc, I_B = 0)	MPS2222 MPS2222A	$V_{(BR)CEO}$	30 40	– –	Vdc
Collector–Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	MPS2222 MPS2222A	$V_{(BR)CBO}$	60 75	– –	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	MPS2222 MPS2222A	$V_{(BR)EBO}$	5.0 6.0	– –	Vdc
Collector Cutoff Current (V_{CE} = 60 Vdc, $V_{EB(off)}$ = 3.0 Vdc)	MPS2222A	I_{CEX}	–	10	nAdc
Collector Cutoff Current (V_{CB} = 50 Vdc, I_E = 0) (V_{CB} = 60 Vdc, I_E = 0) (V_{CB} = 50 Vdc, I_E = 0, T_A = 125°C) (V_{CB} = 50 Vdc, I_E = 0, T_A = 125°C)	 MPS2222 MPS2222A MPS2222 MPS2222A	I_{CBO}	 – – – –	 0.01 0.01 10 10	μAdc
Emitter Cutoff Current (V_{EB} = 3.0 Vdc, I_C = 0)	MPS2222A	I_{EBO}	–	100	nAdc
Base Cutoff Current (V_{CE} = 60 Vdc, $V_{EB(off)}$ = 3.0 Vdc)	MPS2222A	I_{BL}	–	20	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 0.1 mAdc, V_{CE} = 10 Vdc) (I_C = 1.0 mAdc, V_{CE} = 10 Vdc) (I_C = 10 mAdc, V_{CE} = 10 Vdc) (I_C = 10 mAdc, V_{CE} = 10 Vdc, T_A = –55°C) (I_C = 150 mAdc, V_{CE} = 10 Vdc) (Note 1.) (I_C = 150 mAdc, V_{CE} = 1.0 Vdc) (Note 1.) (I_C = 500 mAdc, V_{CE} = 10 Vdc) (Note 1.)	 MPS2222A only MPS2222 MPS2222A	h_{FE}	 35 50 75 35 100 50 30 40	 – – – – 300 – – –	–
Collector–Emitter Saturation Voltage (Note 1.) (I_C = 150 mAdc, I_B = 15 mAdc) (I_C = 500 mAdc, I_B = 50 mAdc)	 MPS2222 MPS2222A MPS2222 MPS2222A	$V_{CE(sat)}$	 – – – –	 0.4 0.3 1.6 1.0	Vdc
Base–Emitter Saturation Voltage (Note 1.) (I_C = 150 mAdc, I_B = 15 mAdc) (I_C = 500 mAdc, I_B = 50 mAdc)	 MPS2222 MPS2222A MPS2222 MPS2222A	$V_{BE(sat)}$	 – 0.6 – –	 1.3 1.2 2.6 2.0	Vdc

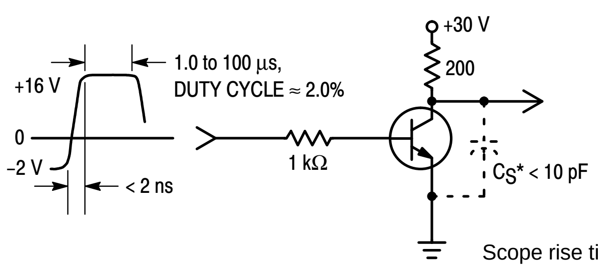
1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

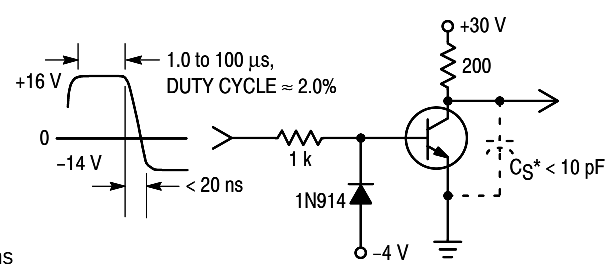
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristic		Symbol	Min	Max	Unit
SMALL–SIGNAL CHARACTERISTICS					
Current–Gain – Bandwidth Product (Note 2.) (I_C = 20 mAdc, V_{CE} = 20 Vdc, f = 100 MHz)	MPS2222 MPS2222A	f_T	250 300	– –	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)		C_{obo}	–	8.0	pF
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)	MPS2222 MPS2222A	C_{ibo}	– –	30 25	pF
Input Impedance (I_C = 1.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz) (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	MPS2222A MPS2222A	h_{ie}	2.0 0.25	8.0 1.25	kΩ
Voltage Feedback Ratio (I_C = 1.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz) (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	MPS2222A MPS2222A	h_{re}	– –	8.0 4.0	X 10^{-4}
Small–Signal Current Gain (I_C = 1.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz) (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	MPS2222A MPS2222A	h_{fe}	50 75	300 375	–
Output Admittance (I_C = 1.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz) (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	MPS2222A MPS2222A	h_{oe}	5.0 25	35 200	μmhos
Collector Base Time Constant (I_E = 20 mAdc, V_{CB} = 20 Vdc, f = 31.8 MHz)	MPS2222A	$rb'C_c$	–	150	ps
Noise Figure (I_C = 100 μAdc, V_{CE} = 10 Vdc, R_S = 1.0 kΩ, f = 1.0 kHz)	MPS2222A	NF	–	4.0	dB
SWITCHING CHARACTERISTICS MPS2222A only					
Delay Time	(V_{CC} = 30 Vdc, $V_{BE(off)}$ = –0.5 Vdc, I_C = 150 mAdc, I_{B1} = 15 mAdc) (Figure 1)	t_d	–	10	ns
Rise Time		t_r	–	25	ns
Storage Time	(V_{CC} = 30 Vdc, I_C = 150 mAdc, I_{B1} = I_{B2} = 15 mAdc) (Figure 2)	t_s	–	225	ns
Fall Time		t_f	–	60	ns

2. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

SWITCHING TIME EQUIVALENT TEST CIRCUITS





Scope rise time < 4 ns
*Total shunt capacitance of test jig, connectors, and oscilloscope.

Figure 1. Turn–On Time

Figure 2. Turn–Off Time

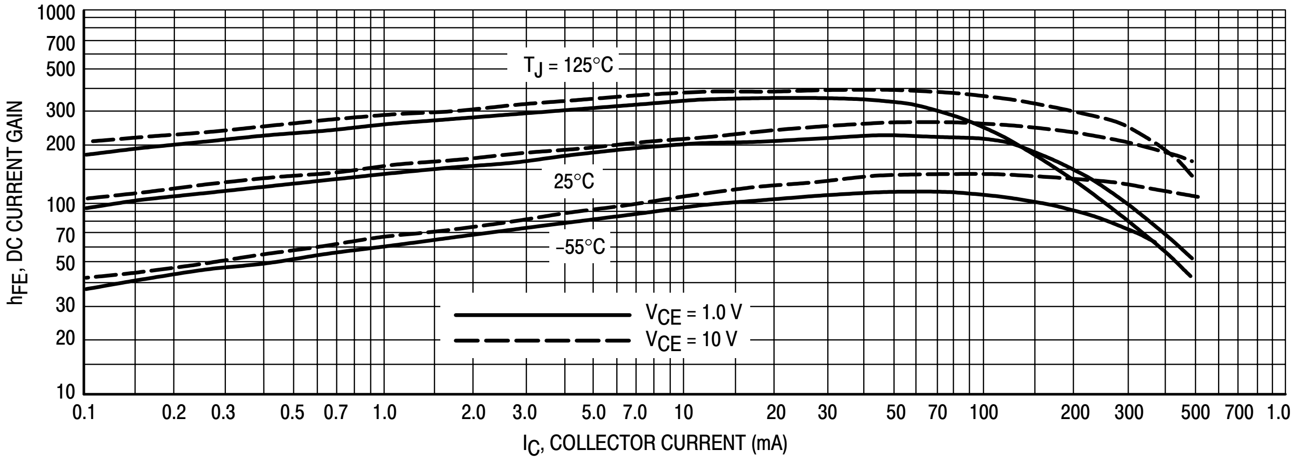


Figure 3. DC Current Gain

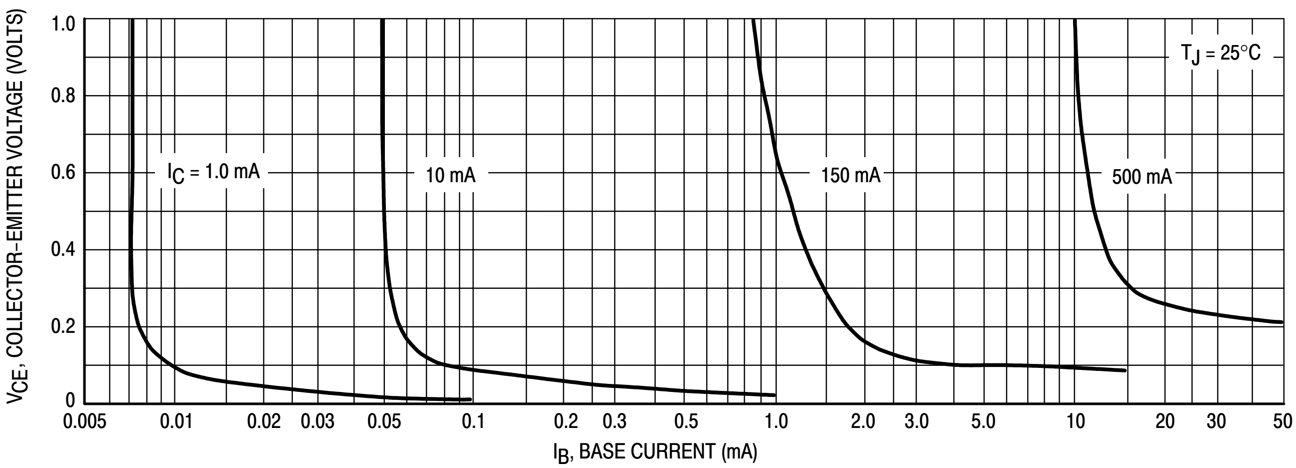


Figure 4. Collector Saturation Region

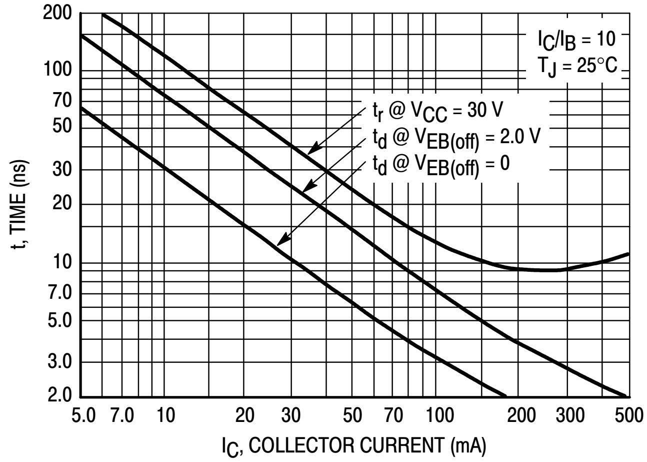


Figure 5. Turn−On Time

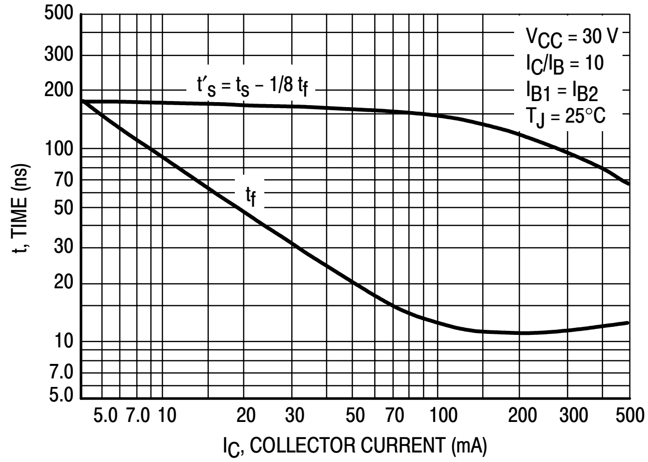


Figure 6. Turn−Off Time

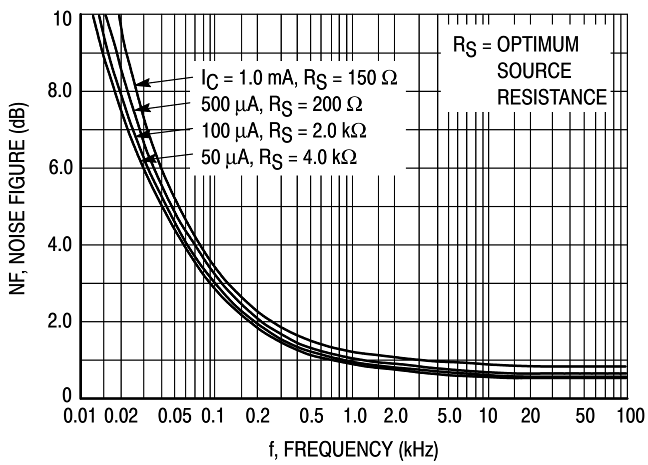


Figure 7. Frequency Effects

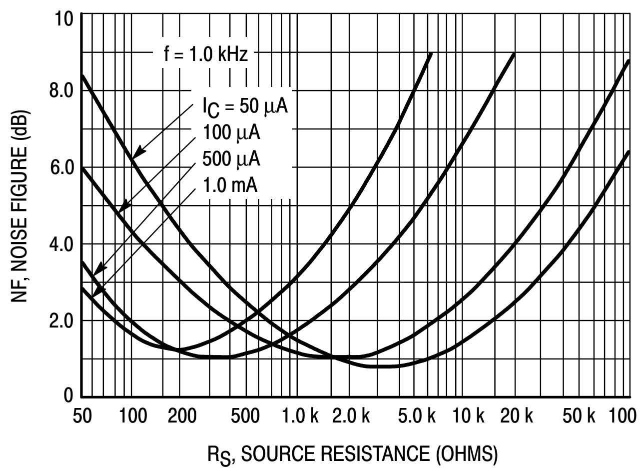


Figure 8. Source Resistance Effects

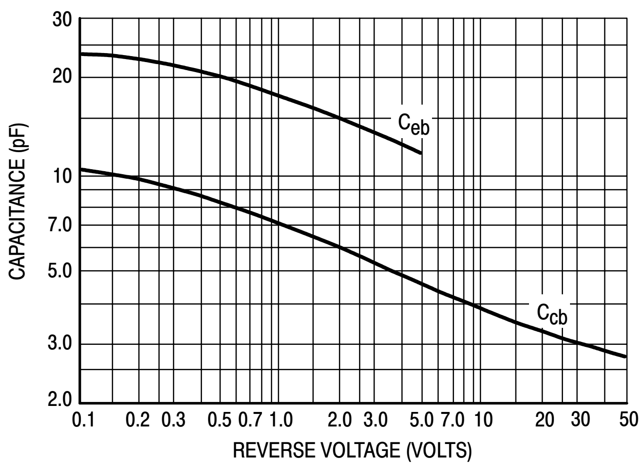


Figure 9. Capacitances

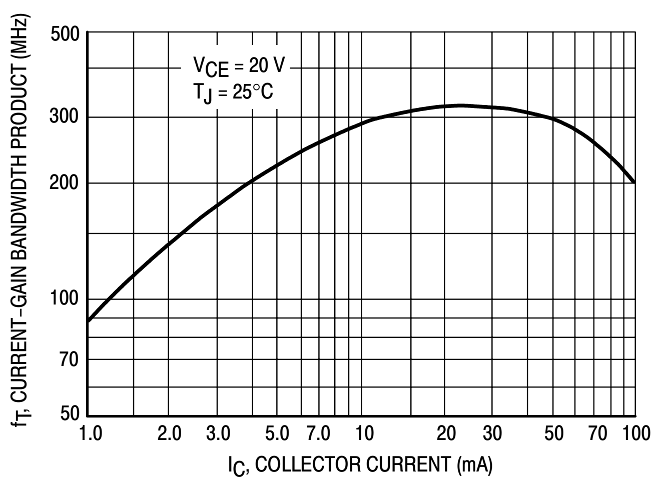


Figure 10. Current−Gain Bandwidth Product

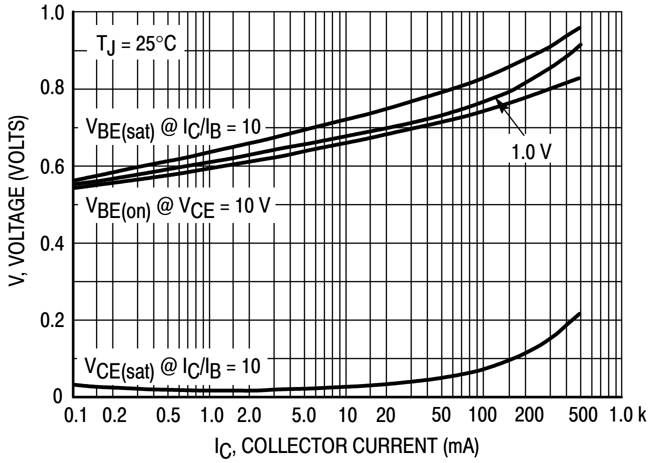


Figure 11. “On” Voltages

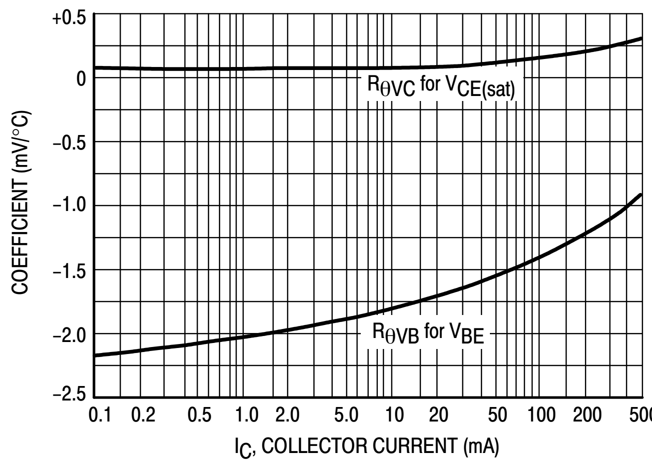
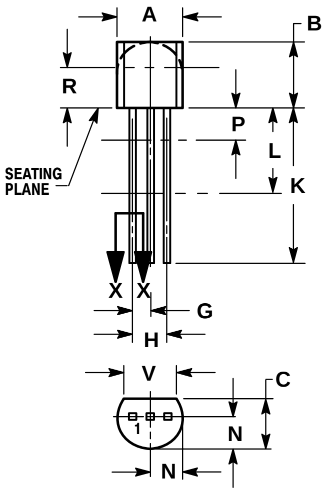
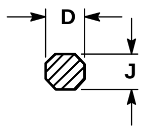


Figure 12. Temperature Coefficients

PACKAGE DIMENSIONS

TO–92
TO–226AA
CASE 29–11
ISSUE AL





SECTION X–X

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---

STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 14:
PIN 1. EMITTER
2. COLLECTOR
3. BASE

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
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Phone: 81–3–5740–2700
Email: r14525@onsemi.com

ON Semiconductor Website: http://onsemi.com

For additional information, please contact your local Sales Representative.